Space Weather Forecast

Issued on Friday, 16 August 2024 at 13:14 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor/Moderate G1/2 geomagnetic storm likely in UTC day of Saturday 17 August. R1/R2 Minor/Moderate radio blackouts expected throughout, slight chance R3 'strong'.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been low over the past 24 hours, with frequent small mid-ranking Common-class X-ray flares observed. The largest event of the period was a long-period Common-class flare peaking at 15/1735UTC, appearing to emanate from a sunspot region in the southwest, although there was some concurrent southwestern solar horizon-based activity.

There are now up to 13 sunspot regions on the facing side of the Sun, with two newly-arriving regions potentially populating the far southeast, while a third magnetically 'unipolar' spot developed in the southwest. There are now three main regions on the current solar disc in terms of nominal complexity, although analysis of two of these is suffering from the very narrow viewing angle. Trends were hard to distinguish as a result, although the arriving region appears to have developed some new leading spots in the period. The largest and most apparent of the remainder is a large region in the northwest - the main trend in the past day has been a fading of its leading spots and mobile small spots in its southern portion.

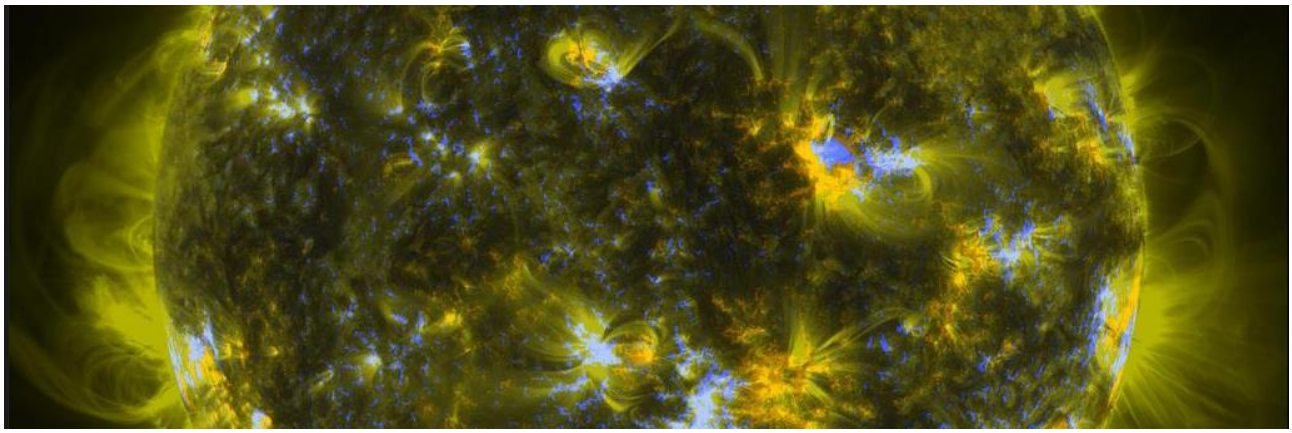

Figure 1: False-colour extreme UV and magnetic composite image of the solar equatorial regions. Note the magnetic flux looping over the oncoming eastern solar horizon (yellow lines on far left of the image) – part of the rationale for maintaining the current X-ray flare risk beyond the imminent departure of the large sunspot region in the southwest (lower right). Image retrieved 16/1130UTC https://sdo.gsfc.nasa.gov/data/ courtesy aia.lmsal.com.

A possible 'filament eruption' (arc of plasma) was observed in near-infrared imagery at 16/0955UTC from S10W030, with imagery awaited. There was no conclusive Coronal Mass Ejection (CME) evidence in the period, although some activity was also seen in the northwest in the period 16/0001-0200UTC in the vicinity of one of the more complex sunspot regions. At the

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time of writing this did not appear to translate to any CME on satellite imagery. No Earth-directed CMEs were observed leaving the Sun in this period.

Solar Wind / Geomagnetic Activity: Solar winds were reflective of a slow regime and the solar wind speed was at background levels. The number of particles in the solar wind was a little higher than average at times although not strongly so, and was not tied to any particularly obvious mechanism. The associated magnetic field saw a gradual decrease in the 24 hours, with the main behaviour being a chiefly co-aligned orientation with Earth's field at first, gradually giving way to a mainly anti-aligned character later.

The net result of the above solar wind measures was for provisionally mainly quiet geomagnetic indices.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is expected, with a daily slight chance of isolated Strong-class flares. This risk is judged constant throughout, with significant departing regions perhaps in some way compensated for by the weight of numbers of eastern solar horizon arrivals.

Solar Wind /Geomagnetic Activity: A faint CME occurred due to the Strong-class X-ray flare at 14/0640UTC, and is forecast to arrive at Earth day 2 (Saturday 17 August). The strength of this is low confidence. This has the potential to be further enhanced by a fast wind, however the fast wind itself this is most likely to remain slightly north of the plane of the Earth's orbit. Mainly quiet geomagnetic activity is therefore expected at first, giving way to likely G1/G2 Minor to Moderate Geomagnetic Storm on day 2 (Saturday 17 August) due to the aforementioned CME's arrival. There is a slight chance of this event reaching G3 Strong (Kp 7) Storm. Activity should then revert to quiet over the course of day 3 (Sunday 18 August).

Energetic Particles / Solar Radiation: No solar radiation storms are expected, however there is an increasing Chance of breaching S1 Minor solar radiation storm level.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	70	40	1
Strong	G3	No	1	15	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	75	75	75	75
Very Active	R3 to R5 X	No	20	20	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	20	25	25	25
Very Active	≥ S3 *	No	5	5	5	5
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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